

Dependence of economic growth on government expenditure by function in the Baltic states

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Abstract. The aim of this research is to examine the dependence of economic growth on government spending by function in the Baltic countries – Lithuania, Latvia, and Estonia. The author has used total expenditure and composition approaches to explore the relationship between the variables. The investigation covers the period from 1996 to 2020. The author has employed descriptive statistics and econometric techniques, including automatic linear modelling (ALM). The study's insights reveal that the growth of the Latvian and Estonian economies depends on general government spending. This dependence is similar in both countries, that is, 62.8% in Latvia and 66.5% in Estonia. In Lithuania, 57.7% of fluctuations in economic growth are explained by spending on social protection. In Latvia, the influence of spending on social protection and economic affairs amounts to 63.4% of economic growth. In Estonia, spending on social protection and health explains 78.1% of the fluctuations in economic growth. The findings of the study may be useful in ensuring a more efficient allocation of government finances in the Baltic states.

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1. INTRODUCTION

Various studies have examined the relationship between economic growth and government spending. The insights do not provide a complete picture, as they are often contradictory (Popescu & Diacomu (Maxim), 2021). The results of the research could be classified into three groups (Nyasha & Odhiambo, 2019). The first group includes studies that found a positive growth-government expenditure relationship (Alexiou, 2009; Shahid et al., 2013; Kimaro et al., 2017; Raghupathi & Raghupathi, 2020), while the second group includes studies that discovered a negative relationship between the considered variables (Schaltegger & Torgler, 2006; Barrios & Schaechter, 2008; Butkiewicz & Yanikkaya, 2011; Altunc & Aydin, 2013; Hasnul, 2015; Saez et al., 2017; Lupu et al., 2018). The third group consists of studies in which the researchers did not find a significant growth-government spending dependence (Wahab, 2011; Hasnul, 2015; Mokoena et

al., 2020). Economic theory assumes that public spending has a spill-over effect on economic development. Three approaches to the growth-government spending nexus dominate the scientific literature. The Keynesian view is that an increase in government spending boosts economic growth through multiplier effects (Keynes, 1936; Iniguez-Montiel, 2010). In contrast, the Wagnerian approach argues that increases in government spending are the result of economic growth (Wagner, 1892). Wagner identified three main sectors influencing the growth of public expenditure, namely administrative costs, social protection, and welfare provision (Laboure & Taugourdeau, 2018). Meanwhile, the classical view supports the idea that increases in government spending have a negative impact on private investment and hamper long-term economic development (Blinder & Solow, 1972; Palley, 2013; Chen et al., 2020). According to Chu (2018), understanding how to properly allocate financial resources to different activities is a challenge for both policy makers and economic researchers. The 20th century was characterised by increasing levels of government spending and activities. According to Kutasi & Marton (2020), this could happen due to a number of reasons, including politicians' intentions to increase the public budget, past economic and financial crises, or increasing demand for social services. In this context, the growth of Baltic government expenditure over the period 1996–2020 was no exception. In Lithuania, general government spending as a share of GDP increased from 36.6 % in 1996 to 42.9 % in 2020; in Latvia from 35.4 % to 43.1 %; and in Estonia, from 38.9 % to 45.9 % (Eurostat, 2021a). Over the same period, real GDP per capita also increased. In Latvia and Lithuania, it more than tripled, and in Estonia, it more than doubled (Eurostat, 2021b). Figures 1 and Figure 2 present the tendencies of general government spending and real GDP per capita in the Baltic countries compared to the EU-27 average.

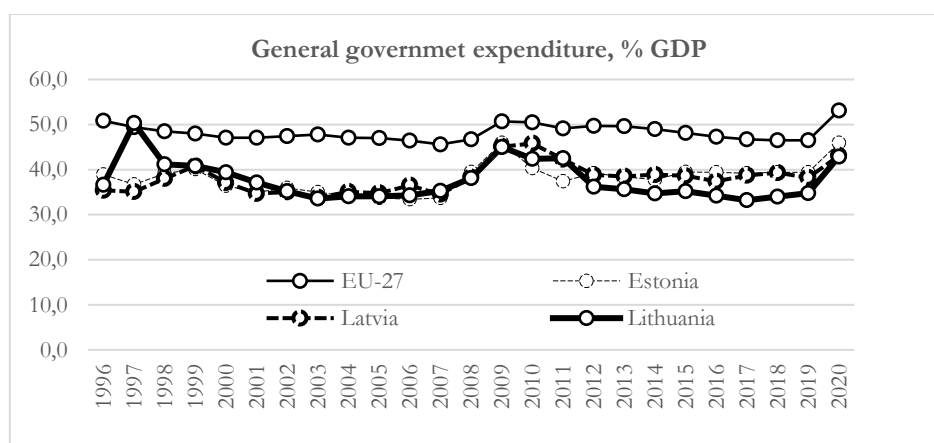


Figure 1. The trends of government expenditure in 1996 – 2020

Source: Eurostat (2021a).

During the period 1996–2020, the three Baltic countries showed similar trends in government expenditure. It is noted that during the analysed period, the average government expenditure in the EU-27 was higher than in the three Baltic nations. Furthermore, the Baltic states have experienced higher fluctuations in the level of government spending than the EU-27 average. This was also due to fluctuations in economic performance in the Baltic countries, which exceeded the average of the EU-27.

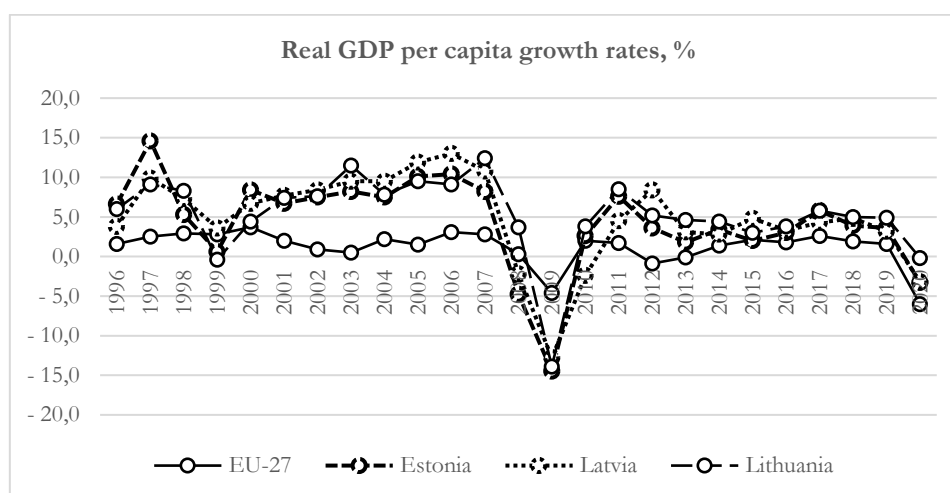


Figure 2. The trends of real GDP per capita in 1996 – 2020

Source: Eurostat (2021b)

Research problem: Is there a dependence of economic growth on government spending by function in the Baltic States? Which government activities stimulate economic growth and which have negative effects?

Research aim: Examine the dependence of economic growth on government spending by function by answering the question of which activities promote and inhibit economic growth.

The investigation consists of introduction, literature review, methodological approach and the main findings.

2. FINDINGS OF RESEARCH AND METHODOLOGICAL APPROACH

2.1. Insights from the studies

Over the past decade, many researchers have analysed the government spending – economic growth nexus (Macek, 2014; Gemmell et al., 2016; Afonso & Alves, 2017; Malcolm, 2017; Dudzevičiūtė & Giedraitytė, 2017; Laboure & Taugourdeau, 2018; Chen et al., 2020; Mokoena et al., 2020; Kutasi & Marton, 2020; Wahyudi, 2020; Raghupathi & Raghupathi, 2020; Popescu & Diacomu (Maxim), 2021; Ugochukwu & Oruta, 2021) and revealed mixed results. Some expenditures that are considered productive in advanced countries may be unproductive in developing countries, and vice versa (Awuh, 2018). Knowledge of the dependence of economic growth on the general government sector contributes to a better perception of structural problems in public finances and public policy issues (Arpaia & Turrini, 2008). Ugochukwu & Oruta (2021) argue that government expenditure is an important tool for achieving price stability, high employment rates, improved living standards, and economic growth. However, concerns regarding poverty and social exclusion, inflation rates, and other socio-economic issues are increasingly raising questions about the effectiveness of government spending in achieving these objectives. Furthermore, public spending stimulates economic development by maximising the efficiency of the private sector, up to a point beyond which efficiency begins to decline (Lee et al., 2019). The author provides key insights from contemporary investigations conducted around the world.

The study by Macek (2014) detected negative growth-government expenditure dependence. The author suggested that this finding is likely to be related to the crowding-out effect on the structure of government expenditure, which is dominated by non-productive spending. A study by Gemmell et al. (2016) in OECD

countries found that spending on transport and communications, as well as spending on education positively impacts economic growth rates. In addition, the research also detects a positive effect on housing and healthcare spending and a negative effect on social welfare spending. Afonso & Alves (2017) applied Wagner's approach of exploring government expenditure by function in 14 European countries from 1996 to 2013. The authors found that in Portugal, France, Austria and the Netherlands, Wagner's law held that economic expansion led to an increase in public spending. Malcom (2017) analysed the appropriate level of public spending to maximize economic development in Jamaica from 1993 to 2016. The study showed that the calculated optimal level of government spending was above average at 33.2%. Dudzevičiūtė & Giedraitytė (2017) considered how government spending contributed to economic development in selected countries of the European Union from 1997 to 2017. The investigation suggested different results regarding the economic development-expenditure nexus across the countries under consideration. Unproductive spending predominates in the general government expenditure structures of countries with a high level of economic development (Denmark, France and Sweden). The economies of the lower level countries (Lithuania, Cyprus, Hungary, Greece, and Estonia) had relatively higher productive expenditures than higher level economies. Countries with similar levels of economic development have similar government spending structures. Similar results were obtained in the research by Laboure & Taugourdeau (2018). The investigation used data from 147 countries with various levels of development from 1970 to 2008. The scientists found a strong dependence between the level of economic development and the level of government expenditure. Poor countries' budgets were dominated by productive spending. In richer countries, meanwhile, unproductive spending predominated. Furthermore, the researchers determined that education expenditure can be classified as productive public spending. The investigation of Awuh (2018) shows that government spending on health, defence, education, transport, communication, agriculture, and capital has a statistically significant impact on economic growth in developing countries. In developed countries, the impact of total expenditure is negative and significant; however, spending's on health is insignificant. In addition, spending on capital, communication, agriculture and transport is positively related to economic growth (Awuh, 2018). The study by Chen et al. (2020) highlighted the importance of allocating finances to different areas for long-term economic growth. Public spending on health, education, wages, and agriculture promotes economic growth in Vanuatu. Kutasi & Marton (2020) investigated various types of government spending and economic development in countries of the European Union in the period 1996–2017. The researchers found that spending on general public services, social protection, and education negatively impacts economic development, while spending on health has a positive effect. Furthermore, it should be noted that expenditure on health and education has a lagged effect on economic development. The authors described this phenomenon as unusual and new in a scientific context. Raghupathi & Raghupathi (2020) explored the interlinkages of public health expenditure and economic development in the USA from 2003 to 2014. They detected a positive links between health spending and economic indicators such as GDP, income, and labour productivity. Wahyudi (2020) supports the Keynesian view, arguing that government spending promotes economic development. The author concluded that public spending could be used as a policy tool to stimulate economic development in Indonesia.

To summarise, the results of the most recent studies vary from country to country. There is a broad consensus that government spending is an essential tool for achieving macroeconomic objectives. However, issues related to the structure of government spending and the levels of the efficiency of government expenditure remain unresolved and open to further debate.

The next section highlights the main aspects of the research methodology.

2.2. Research methodology

Data. The analysis covers the period from 1996 to 2020. The data are taken from the Eurostat database, which presents annual information about the growth rates of real GDP per capita and government expenditure by function as a percentage of GDP.

Methodology. The author of this study raises the following questions:

- How does government spending by function affect economic growth in Lithuania?
- How does government spending by function affect economic growth in Latvia?
- How does government spending by function affect economic growth in Estonia?
- What differences in results emerge between the Baltic countries in terms of the links between government spending and economic growth?

The empirical analysis is based on an automatic linear modelling (ALM), which speeds up the data analysis process by automatically selecting the variables and preparing the data (Yang, 2013). This technique is superior to traditional regression modelling, which has drawbacks such as being limited to a stepwise approach and optimality statistics for variable selection, not being able to automatically handle outliers, not being able to perform ensemble models to improve predictions, and not being able to interact with the SPSS server program to work with very large data (Yang, 2013). In selecting the variables for the analysis, the author has drawn on the insights revealed by Chu (2018) and Kutasi & Marton (2020). The dependent variable in the model is the annual percentage change in real GDP per capita, while the independent variable consists of various types of government expenditure indicators. All the variables used in the analysis and their descriptions are given below.

Y- Real GDP per capita (dependent variable). The indicator is calculated as the ratio of real gross domestic product to the average population in a given year. It is a measure of economic performance and is also used as an indicator of a country's material standard of living (Eurostat, 2022).

Eurostat (2021a) provides a breakdown of the expenditure of general government by economic function.

X₁- General public service (independent variable).

X₂- Defence (independent variable).

X₃- Public order and safety (independent variable).

X₄- Economic affairs (independent variable).

X₅- Environmental protection (independent variable).

X₆- Housing & community amenities (independent variable).

X₇- Health (independent variable).

X₈- Recreation, culture and religion (independent variable).

X₉- Education (independent variable).

X₁₀-Social protection (independent variable).

The function below expresses the relationship between the variables:

$$\text{Real GDP per capita} = f (X_1, X_2, \dots, X_{10}) \quad (1)$$

The investigation involves the following steps:

Step 1. Correlation analysis, which answers the questions about the existence, strength and direction of relationships between the variables.

Step 2. Automatic linear modelling (ALM), which speeds up the process of data analysis by using a number of automated mechanisms and helps in choosing the right forecasting model.

To quantify the interdependence of the variables and to make predictions, the author constructed an econometric model as the final result of the study, which is presented below:

$$Y = a_0 + b_1X_1 + b_2X_2 \dots \dots \dots + b_{10}X_{10} \quad (2)$$

Where:

Y is a dependent variable, a_0 is constant, b_1, \dots, b_{10} are coefficients, X_1, \dots, X_{10} are independent variables.

The author performed the calculations using IBM SPSS 27v package.

3. RESULTS OF THE INVESTIGATIONS AND DISCUSSION

3.1. Government expenditure – economic growth nexus

The investigation starts with Spearman's correlation analysis, which allows assessing the direction and strength of the relationship between the variables in question, regardless of whether they are normally distributed or not.

Correlation analysis. Table 1 summarises the correlation analysis for the Baltic countries.

Table 1

Spearman's correlation between economic growth and government expenditure

Variables	Correlation coefficient	Significance (2-tailed)	Correlation coefficient	Significance (2-tailed)	Correlation coefficient	Significance (2-tailed)
	Lithuania		Latvia		Estonia	
Total government expenditure (TGE)	-0.315	0.125	-0.748**	0.000	-0.873**	0.000
Public services	0.073	0.728	-0.199	0.339	-0.417*	0.038
Defence	0.211	0.312	-0.163	0.437	-0.579	0.002
Public order & safety	0.229	0.270	0.411*	0.041	0.222	0.287
Economic affairs	0.068	0.745	-0.544**	0.005	-0.576**	0.003
Environmental protection	-0.168	0.423	0.023	0.913	-0.023	0.912
Housing & communities amenities	-0.254	0.221	0.163	0.437	-0.289	0.162
Health	-0.333	0.103	-0.356	0.081	-0.518**	0.008
Recreation, culture, & religion	-0.343	0.093	-0.419*	0.037	-0.091	0.665
Education	-0.030	0.888	-0.612	0.001	-0.220	0.291
Social protection	-0.717**	0.000	-0.537**	0.006	-0.747**	0.000

Source: author's calculations based on SPSSv27.

Note: ** Significant at the 0.01 level.

* Significant at the 0.05 level.

Spearman’s correlation revealed a significant negative interrelationship between social protection spending and economic growth in Lithuania. In Latvia, the author found significant negative correlations between total government spending, spending on economic affairs, recreation, culture and religion, social protection and economic growth. Meanwhile, a positive correlation was found between spending on public order and safety and economic growth. The analysis in Estonia revealed a significant negative correlation between total government expenditure, spending on public services, economic affairs, health, social protection and economic growth. In summary, the analysis shows a significant negative relationship between social protection expenditure and economic growth in all three Baltic countries.

Correlation analysis allowed us to identify statistically significant factors for automatic linear modelling (ALM).

Automatic Linear Modelling. This model speeds up the data analysis process through a number of automated mechanisms and helps to select appropriate forecasting models for Lithuania, Latvia and Estonia. The statistical analysis carried out by the ALM includes economic growth as the target variable and government expenditure by function as independent variables.

The case of Lithuania. Analysing the case of Lithuania, economic growth is chosen as the dependent variable (target = Y) and social protection expenditure as the independent variable (X10). Automatic linear modelling and forward stepwise regression (FSR) were used to construct a conceptual model of the dependence between social protection expenditure and economic growth. The ALM provides the results with a significance level of less than 0.05 in the form of a graph (Fig. 3), and in the Table 2.

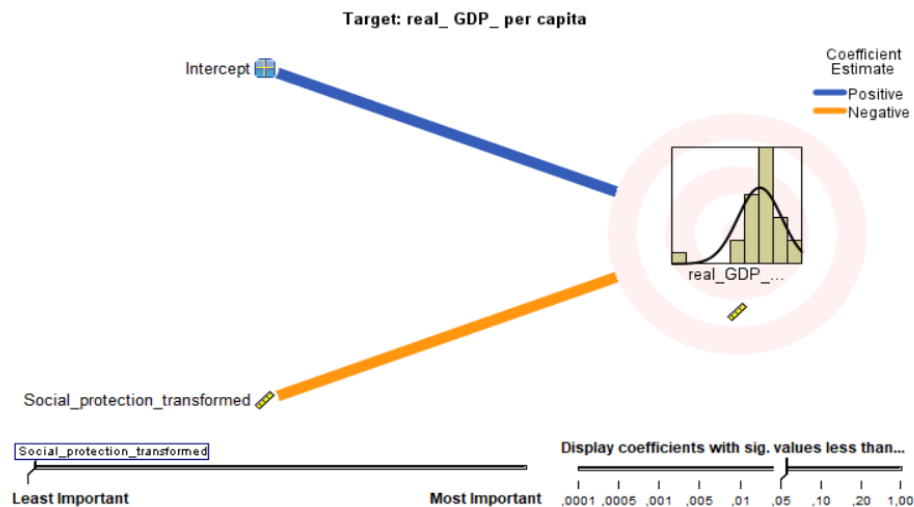


Figure 3. ALM results: the effects of social protection expenditure on real GDP per capita growth in Lithuania

Source: calculations based on SPSSv27

Figure 3 shows that spending on social protection negatively impacts economic growth. This means that as social protection spending increases, economic growth tends to fall.

Table 2

Coefficient estimates: the case of Lithuania

Model terms	Coefficients	Significance	Importance
Intercept	30.957	0.000	
Social protection (transformed)	-2.056	0.000	1.000
R Square adjusted	0.577		

Source: calculations based on SPSSv27.

In the case of Lithuania, the regression model can be expressed as the following equation:

$$Y = 30.957 - 2.056 X_{10} \tag{3}$$

The coefficient of determination shows that social protection expenditure explains 57.7% of the variation in growth rates.

The case of Latvia. In the case of Latvia, economic growth is chosen as the dependent variable (target = Y) and total government expenditure, as well as spending on economic affairs and social protection as independent variables (X₄ and X₁₀). Automatic linear modelling and forward stepwise regression (FSR) were used to construct a conceptual model of the dependence between spending on economic affairs and social protection and economic growth rates. In the data analysis process, public order and safety expenditure, as well as recreation, culture, and religion expenditure, was automatically excluded from further modelling due to the statistical insignificant effect on the target variable. The ALM provides the results with a significance level of less than 0.05 in the form of a chart (Fig. 4), and in the Table 3.

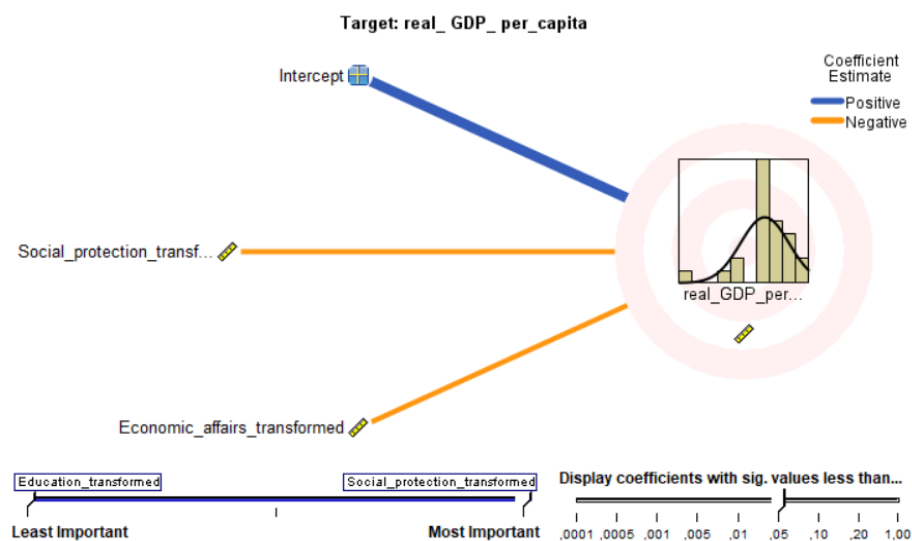


Figure 4. ALM results: the effects of independent variables on real GDP per capita growth in Latvia

Source: calculations based on SPSSv27

Figure 4 shows that spending on social protection and economic affairs has a negative impact on economic growth. This means that as social protection and economic affairs spending rises, economic growth rates tend to fall.

Table 3

Coefficient estimates: the case of Latvia

Model terms	Coefficients	Significance	Importance
Intercept	54.940	0.000	
Social protection (transformed)	-1.123	0.015	0.453
Economic affairs (transformed)	-1.602	0.025	0.373
R Square adjusted	0.634		

Source: calculations based on SPSSv27.

In the case of Latvia, the dependence of economic growth on government expenditure by function can be expressed by the following equation:

$$Y = 54.940 - 1.123 X_{10} - 1.602 X_4 \quad (4)$$

The coefficient of determination shows that spending on social protection and economic affairs explains 63.4% of the fluctuations in economic growth. Additionally, the ALM has revealed a statistically significant dependence of economic growth on total government spending. Results of the modelling are presented in Table 4.

Table 4

Coefficient estimates: the case of Latvia

Model term	Coefficient	Significance	Importance
Intercept	57.613	0.000	
Total government expenditure (transformed)	-1.384	0.000	1.000
R Square adjusted	0.628		

Source: calculations based on SPSSv27.

The dependence of economic growth on total government spending can be expressed as the following equation:

$$Y = 57.613 - 1.384 * TGE \quad (5)$$

The coefficient of determination shows that total government expenditure explains 62.8% of the variation in economic growth.

The case of Estonia. In the case of Estonia, economic growth is chosen as the dependent variable (target = Y) and total government expenditure, as well as spending on health and social protection as independent variables (X_7 and X_{10}). The conceptual model of the relationship between health and social protection expenditure and growth rates was built using automatic linear modelling and forward stepwise regression (FSR). In the data analysis, spending on public services and economic affairs was automatically excluded from further modelling due to a statistically insignificant effect on the dependent variable. The ALM provides the results with a significance level of less than 0.05 in the form of a graph (Fig. 5), and in the Table 5.

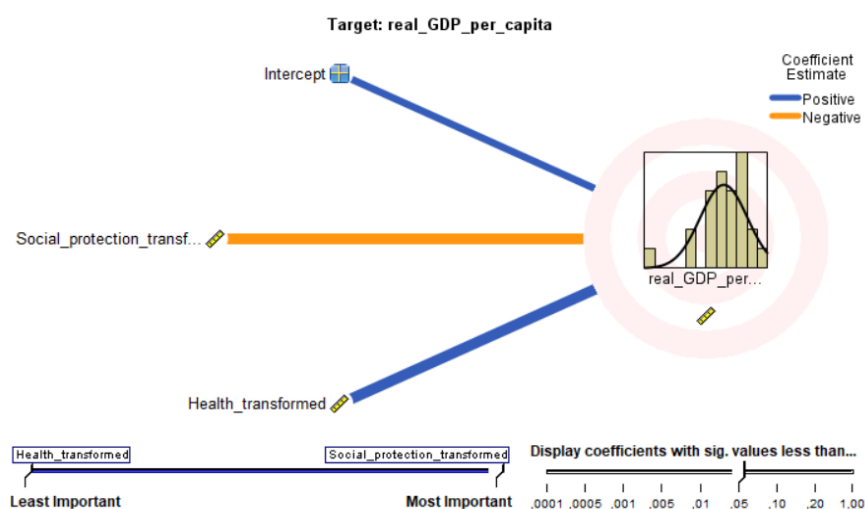


Figure 5. ALM results: the effects of independent variables on real GDP per capita growth in Estonia

Source: calculations based on SPSSv27

Figure 5 shows that social protection spending negatively impacts growth rates, while health spending has a positive impact. On the one hand, economic growth tends to slow down as social spending rises. On the other hand, increasing health financing boosts economic growth.

Table 5

Coefficient estimates: the case of Estonia

Model terms	Coefficients	Significance	Importance
Intercept	15.992	0.040	
Social protection (transformed)	-5.123	0.000	0.728
Health (transformed)	9.558	0.000	0.272
R Square adjusted	0.781		

Source: calculations based on SPSSv27.

In the case of Estonia, the regression model can be expressed as the following equation:

$$Y = 15.992 - 5.123 X_{10} + 9.558 X_7 \tag{6}$$

The coefficient of determination shows that 78.1% of fluctuations in economic growth are explained by spending on social protection and health care. Additionally, the ALM has revealed a statistically significant effect of total government spending growth rates. The results of the modelling are presented in Table 6.

Table 6

Coefficient estimates: The case of Estonia

Model term	Coefficient	Significance	Importance
Intercept	60.400	0.000	
Total government expenditure (transformed)	-1.470	0.000	1.000
R Square adjusted	0.665		

Source: calculations based on SPSSv27.

The dependence of economic growth on total government expenditure can be expressed as the following equation:

$$Y = 60.400 - 1.470 * TGE \quad (7)$$

The coefficient of determination shows that total government expenditure explains 66.5% of the variation in economic growth.

The next section discusses the results of the study.

3.2. Discussion

Economic theory suggests that a country's economic development depends on government spending, and that this dependence can be positive, negative, and neutral. Economic theory is developed from three perspectives that dominate the work of scholars. First, the Keynesian approach argues that increasing government spending boosts economic growth (Keynes, 1936; Iniguez-Montiel, 2010). Second, the Wagnerian approach argues that government spending increases in response to economic growth (Wagner, 1892). Third, the classical view supports the idea that increases in government spending impede long-term economic growth (Blinder and Solow, 1972; Palley, 2013; Chen et al., 2020). Understanding how best to allocate scarce financial resources to different economic activities is a problem not only for policymakers but also for economic researchers (Chu, 2018). A review of the literature shows that the dependence of economic development on the composition of public spending has been the subject of intense scientific debate with mixed results. This study reveals that there is some evidence in Lithuania, Latvia and Estonia that economic growth rates depend on government spending for certain functions. In the three Baltic countries, social protection spending negatively impacted growth rates in the period 1996–2020. This insight is in line with the results of Gemmell (2016) and Kutasi & Marton (2020), who studied the countries of the OECD and the EU. In the cases of Latvia and Estonia, total government spending negatively impacts on economic growth rates. This impact is similar in both countries, at approximately 63% in Latvia and 67% in Estonia. This insight reflects the findings of Macek (2014); Butkiewicz & Yanikkaya (2011); Altunc & Aydin (2013); Hasnul (2015); Saez et al. (2017); Awuk (2018), and Lupu et al. (2018). It is also in line with the classical view that government expenditure retards economic development. In addition, the author detected a significant negative impact of spending on economic affairs on Latvia's growth rates. In the case of Estonia, health spending positively impacts growth rates. This insight reflects the results of Gemmell (2016) and Kutasi & Marton (2020), as well as the Keynesian view, which states that rising government spending boosts economic development. This study shows that the Baltic countries' economic growth is not dependent on funding in certain areas, such as education, defence, public order and safety, public services, housing and communities amenities, and environmental protection. The same insight has been also provided by Wahab (2011), Hasnul (2015), Mokoena et al. (2020) in their studies. The question of what level of government spending should be in general and in individual areas to stimulate growth remains unanswered and requires further research. On the one hand, it should be noted that in all three Baltic countries, the overall level of government spending during the period under review was well above the optimal level, which has been confirmed by the studies, at 33.2 % of GDP in Jamaica (Malcom, 2017). However, the author has no reason to deny that the present level of government spending in the Baltic states would not be able to stimulate economic growth if the funds allocated to individual areas were used efficiently; however, this requires further research. The study constructed a series of models to express the dependency between economic growth and government funding in different areas. This could be useful for Baltic governments when making budget allocation decisions to ensure economic growth.

The author acknowledges that this study has limitations. First, the research based on the Keynesian approach evaluates the dependence of economic growth on government expenditure, but fails to assess

Wagner's view, demonstrating that economic growth stimulates government expenditure. Second, the author does not assess the composition of government spending in terms of productive and non-productive public spending. Third, economic growth is not the only aspect that governments take into account when allocating finances. Other important factors, such as poverty and income inequality, should also be considered. Although the study shows that social protection spending negatively impacts growth rates in all three Baltic countries, this should be interpreted with caution, as it can help reduce poverty and income inequality, which is particularly important for the Baltic countries at the moment. These limitations provide hints and suggestions for further research.

4. CONCLUSION

This investigation aimed at considering the dependence of economic growth on government expenditure by function in Lithuania, Latvia, and Estonia.

The period 1996–2020 is characterised by rising levels of government expenditure and activities. The Baltic countries are no exception to this trend in government expenditure growth. In Lithuania, general government spending as a percentage of GDP increased from 36.6 % in 1996 to 42.9 % in 2020; in Latvia, from 35.4 % to 43.1 %; and in Estonia, from 38.9 % to 45.9 %. Over the same period, real GDP per capita also grew. It more than tripled in Latvia and Lithuania and more than doubled in Estonia.

The empirical analysis, based on automatic linear modelling, was carried out using economic growth as the target variable and government spending by function as independent variable. The investigation has revealed that in all three Baltic countries, social protection expenditure negatively impacted economic growth rates in 1996–2020. Social protection expenditure explains 57.7 % of the fluctuations in Lithuania's economic growth. The spending on social protection and economic affairs explains 63.4 % of the fluctuations in Latvia's economic growth rates. In Estonia, spending on social protection and health care explains 78.1 % of the variation in economic growth. In the cases of Latvia and Estonia, total government spending significantly and negatively impacted growth rates. The effect is similar in both countries, with 62.8 % in Latvia and 66.5 % in Estonia. The study also found that Baltic countries' economic growth was not dependent on funding in certain areas, such as education, defence, public order and safety, public services, housing and communities amenities, and environmental protection. The author suggests that while funding in these areas did not have a direct impact on economic growth, it may have had an impact through the implementation of certain projects or programmes in the areas of public security, environment, housing, or education.

The study constructed a number of models to quantify the links between government funding in different areas and economic growth. It is expected to be useful to Baltic governments when deciding how to allocate budgets to ensure economic growth.

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